

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
1 September 2005 (01.09.2005)

PCT

(10) International Publication Number  
**WO 2005/079208 A2**

(51) International Patent Classification: Not classified

(21) International Application Number:  
PCT/US2004/039339

(22) International Filing Date:  
22 November 2004 (22.11.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
60/524,074 21 November 2003 (21.11.2003) US

(71) Applicants (for all designated States except US):  
**TRUSTEES OF BOSTON UNIVERSITY** [US/US];  
One Sherborn Street, Boston, MA 02215 (US). **FRAUN-  
HOFER USA, INC.** [US/US]; 46025 Port Street,  
Plymouth, MI 48170 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **LI, Biao** [CN/US];  
27 Lanark Road, Brighton, MA 02135 (US). **ZHANG, Xin**  
[CN/US]; 62 Bay State Road, #9, Boston, MA 02215 (US).  
**BIFANO, Thomas** [US/US]; 30 Nelson Way, Mansfield,  
MA 02048 (US). **SHARON, Andre** [US/US]; 149 Green-  
wood Street, Newton, MA 02459 (US).

(74) Agents: **HJORTH, Beverly, E.** et al.; Weingarten, Schur-  
gin, Gagnebin & Lebovici, LLP, Ten Post Office Square,  
Boston, MA 02109 (US).

(81) Designated States (unless otherwise indicated, for every  
kind of national protection available): AE, AG, AL, AM,  
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,  
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,  
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,  
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,  
MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG,  
PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM,  
TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM,  
ZW.

(84) Designated States (unless otherwise indicated, for every  
kind of regional protection available): ARIPO (BW, GH,

GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,  
ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),  
European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,  
FR, GB, GR, HU, IE, IS, IT, LU, MC, NL, PL, PT, RO, SE,  
SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ,  
GW, ML, MR, NE, SN, TD, TG).

**Declarations under Rule 4.17:**

- as to applicant's entitlement to apply for and be granted  
a patent (Rule 4.17(ii)) for the following designations AE,  
AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ,  
CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE,  
EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS,  
JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA,  
MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM,  
PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ,  
TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM,  
ZW, ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, NA,  
SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ,  
BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE,  
BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU,  
IE, IS, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI  
patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML,  
MR, NE, SN, TD, TG)
- as to the applicant's entitlement to claim the priority of the  
earlier application (Rule 4.17(iii)) for the following desig-  
nations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW,  
BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ,  
EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID,  
IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU,  
LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ,  
OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY,  
TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA,  
ZM, ZW, ARIPO patent (BW, GH, GM, KE, LS, MW, MZ,  
NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM,  
AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT,  
BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR,  
HU, IE, IS, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR),  
OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,  
ML, MR, NE, SN, TD, TG)
- of inventorship (Rule 4.17(iv)) for US only

**Published:**

- without international search report and to be republished  
upon receipt of that report

[Continued on next page]

(54) Title: UNCOOLED CANTILEVER MICROBOLOMETER FOCAL PLANE ARRAY WITH MK TEMPERATURE RESO-  
LUTIONS AND METHOD OF MANUFACTURING MICROCANTILEVER

(57) Abstract: A microbolometer sensor has a first cantilever supported above a substrate and formed of a bimaterial so as to deform in a first direction in response to incident radiation, and a second cantilever supported above the substrate and formed of a bimaterial so oriented as to cause the second cantilever to deflect oppositely to the first cantilever in response to radiation. The first and second cantilevers have a spacing therebetween that varies as a function of radiation incident on said first and second cantilevers. Means for sensing the deflection of the first and second cantilevers to provide an indication of the incident radiation is provided. A process of forming a micromechanical cantilever structure is also providing by irradiating a cantilever with an ion beam, whereby the cantilever is flattened. Also, the cantilever can be annealed in a rapid thermal annealing process to flatten the cantilever.

WO 2005/079208 A2



---

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*